

5.0 MITIGATION MEASURES

This section is a summary of mitigation measures that have been identified elsewhere in the document. These measures would be implemented in order to reduce the magnitude of the environmental effects of the construction and operation of the facility under either the proposed action or the minimal SRS infrastructure alternative.

5.1 DESIGN AND CONSTRUCTION PRACTICES

All buildings and structures would be designed withstand earthquakes of a Richter magnitude of 5 or less (equivalent to approximately VI on the Modified Mercalli scale) (Sutch 1979). Facilities that store chemicals potentially harmful to the environment (such as the proposed cryogenic fuel plant or hazardous waste storage facility) that could be released during an earthquake would be reinforced according to Uniform Building Code requirements to prevent adverse effects (ICBO 1988).

SRS facilities would be sited to reduce potential visual impacts from important viewpoints, particularly El Camino Real. Facilities would be painted with appropriate colors that would blend with the soil and vegetation of the area. Colors would be selected from the Munsell Soil Color Charts that are keyed to specific soil types and colors. Designs consistent with historical New Mexico style architecture would be employed for permanent structures whenever possible.

During construction, the routine practices listed in Subsection 2.1.6.2, beginning on page 54, would be employed to avoid or minimize the types of potential environmental impacts. These practices include, but are not limited to

- Fugitive dust generated by road, pipeline, and airfield construction would be minimized with an aggressive dust control program. Conditions would be monitored and water sprays and fogs would be applied from water trucks or chemical dust suppressants would be used as appropriate.
- Cultural resources and sensitive species surveys would be completed prior to any construction of buildings, roads, pipelines, transmission lines, and other land disturbing facilities.
- Disturbed areas would be recontoured and revegetated as soon as possible either during or immediately following construction. Only indigenous species that would not require artificial irrigation would be used.

- OSHA regulations in 29 CFR Part 1926 would be strictly complied with to protect construction workers.
- Construction-related borrow pits would be established to minimize impacts on cultural and biological resources and would be closed, recontoured, and revegetated when no longer needed.
- Parking lots would be constructed to allow proper drainage and to minimize fugitive dust.
- Outdoor lighting would be shaded and directed downward to maintain a dark sky environment for astronomical observations and to minimize lighting annoyance.
- No underground fuel storage tanks are planned. However, if any were required in the future, they would be installed and monitored in accordance with Federal and State law.

5.2 SAFETY

Risks to the public would be minimized by ensuring that all non-Federal launch missions would be licensed by the FAA/AST. Flight path restrictions would be used if the vehicle reliability alone could not ensure acceptable risk, and mission restrictions would be imposed, if necessary. RLVs that would be flown from the SRS would be considered safe for over-land flight. They would not jettison components or drop spent stages as ELVs do during normal flight operations. Public access to the SRS would not be allowed in designated safety zones around potentially hazardous areas such as fuel handling and launch and landing areas.

Workplace hazards identified in a job-hazard analysis would be controlled by development of and strict adherence to occupational safety and health safe operating procedures. Safety criteria would be contained in the SRS operating license and the LSSOD, and the ES&H Manual would contain detailed procedures and instructions. Proactive process safety management procedures would be applied to processes and operations requiring the use of hazardous materials, e.g. fuel manufacturing, storage, and loading. System safety engineering would be applied to all aspects of the facility to identify and control hazards.

Special handling requirements would be applied to all cryogenic materials. Piping and equipment would be specially insulated and designed to preclude leakage and direct contact. By following standard construction practices for such facilities, the SRS fuel plant would be designed to minimize the potential for explosive accumulation and mixing of hydrogen and oxygen. Production and storage facilities would be buffered so as to minimize risks to workers and the public in the event of an unplanned event.

1 Until the cryogenic fuel plant is completed, propellants would be transported by truck. Propellants
2 would include liquid hydrogen and liquid oxygen, both of which are considered hazardous materials.
3 Both are routinely shipped in interstate commerce. All hazardous materials would be transported in
4 compliance with applicable DOT regulations.

5 Pyrotechnics would be limited to small quantities of separation devices and rocket motors used to boost
6 payloads from low-earth parking orbits to higher orbits. The storage facility and propellant storage
7 building each would serve a singular function and no other activity would take place at these facilities.
8 These facilities would provide safe and secure storage and would incorporate industry standard
9 explosion-proof construction. They would be constructed and located in conformity with all applicable
10 regulations.

11 The public would be protected from high levels of launch noise by exclusion from areas that would be
12 subjected to excessive levels. Workers would be protected by exclusion or by use of hearing protection
13 equipment as appropriate.

14 During operational periods, official visitors to the SRS would be restricted to those areas approved by
15 NMOSC and the launch operators. Unofficial visitors would be restricted from access to the SRS area
16 by roadblocks established at Exit 32 on I-25 and a location south of Cutter on the existing Sierra County
17 access road. The BLM and other land-controlling authorities would be requested to deny access to
18 unofficial visitors by other access roads.

19 **5.3 WATER RESOURCES**

20 The use of all surface and underground water in New Mexico is governed by the doctrines of prior
21 appropriation and beneficial use. Under these doctrines, and related State law, the State Engineer
22 regulates water rights. All water sources in New Mexico have been appropriated for beneficial use.
23 Moreover, both surface and groundwater supplies are over allocated. In periods of drought, those who
24 established their water rights first can enforce their water rights against those who established their
25 rights later. Water rights can be severed from the land in some cases. Therefore, to obtain water, SRS
26 would have to purchase or otherwise acquire existing water rights or else establish new water rights
27 without adversely affecting present water users.

1 Surface water runoff from rain and snow melt would be controlled according to EPA storm-water
2 discharge requirements. Runoff from construction activities, industrial-type facilities, and the airfield
3 would not be allowed to accumulate in construction-related low-lying areas, such as ditches or borrow
4 pits.

5 Pretreatment and/or posttreatment of water may be required depending on the water source selected.
6 Water treatment processes generate concentrate. The concentrate, with high total dissolved solids,
7 would not be allowed to accumulate in low-lying areas or migrate into groundwater. National Pollutant
8 Discharge Elimination System and underground injection control permits would be obtained where
9 appropriate.

10 The water distribution system would be placed in the already cleared and disturbed road network. A
11 main water storage tank would be located in a depression on Prisor Hill in order to minimize visual
12 impact.

13 **5.4 LAND USE**

14 The SRS would not be a secluded, closed facility. In order to assure the greatest degree of public safety,
15 some degree of control would be required over public use of the area. The area that would be closed
16 to current multiple-use activities during routine work periods would represent only 7% of the proposed
17 SRS area (Subsection 4.8.2.2, beginning on page 260). Current land-use patterns—including agriculture,
18 mining, and recreation—would continue on most of the land with only minor interruptions. The Sierra
19 County *Interim Land Use Policy Plan* would be adhered to as much as possible.

20 Normal recreational activities would be allowed within the safety constraints in joint-use areas. Visitor
21 information and interpretive markers for the SRS, space research and astronomy, and El Camino Real
22 would be provided. Casual visitor access would be accommodated on a small-scale basis so as to avoid
23 interference with flight operations. During periods of launch or landing operations, casual visitors would
24 be precluded from the SRS area as required to ensure public safety (Subsection 5.2, beginning on page
25 307).

26 The stated position of the State of New Mexico is that private land required for SRS development would
27 be acquired by direct purchase or other transfer mechanism. The present land owners would receive
28 adequate, negotiated compensation. The range of potential negotiated settlements include direct

purchase, “life estate” occupancy agreements, leaseback agreements, relocation exchanges and/or transfers, and variable combinations of any of these possibilities.

5.5 BIOLOGICAL RESOURCES

Federal and State sensitive plant species and sensitive habitat would be avoided where possible. If isolated sensitive plants were found in areas to be disturbed, individual plants would be transplanted to suitable habitat outside the area of disturbance.

Federal and State sensitive wildlife species would be avoided during construction and operation where possible. Species of special interest found during the biological surveys include the Western Burrowing Owl, the Ferruginous Hawk, the Loggerhead Shrike, Bell’s Vireo, and the Texas horned lizard. If wolves were found in the area as a result of the proposed reintroduction program on WSMR, the USFWS would be notified. Likewise, if Northern Aplomado Falcons were observed, the USFWS would be notified.

The USFWS is updating the Northern Aplomado Falcon survey protocol. This document would be consulted for future surveys in potential critical habitat areas for this species. A survey for the Northern Aplomado Falcon would be conducted during the nesting season prior to onset of construction activities at the SRS.

Raptor nests within 1 mile of projected construction would be destroyed during the winter season preceding construction activities to preclude occupation during the subsequent nesting seasons. All above ground electrical power lines would be constructed or modified using Raptor Research Foundation, Inc., guidelines to prevent electrocution of raptors.

Plans for managing and monitoring the environmental effects of SRS operations—including those on bird species protected by the Migratory Bird Treaty Act—would be developed and implemented by the NMSLO in accordance with State laws and regulations. The NMSLO would seek input and consultation from Federal and State regulatory and resource management agencies.

5.6 CULTURAL RESOURCES

Cultural resources sites (historic and prehistoric) eligible for nomination to the National Register of Historic Places would be avoided as much as possible. Where the sites could not be avoided, further

testing to determine eligibility, evaluation, and data recovery would be undertaken. If important archaeological or historic resources were discovered during excavation or soil removal activities, that portion of the work would be halted and a qualified archaeologist would be called in to make an assessment. The appropriate land management agency (BLM or NMSLO) and the State Historic Preservation Officer also would be contacted. Further actions in the construction area—and the appropriate notification to potentially concerned Native American groups—would be determined by the land management agency and the Preservation Officer. Particular care would be taken if any human remains were found. Measures would be taken to protect El Camino Real. Road and pipeline construction would cross the trail only at previously disturbed sites after consultation and approval by the land management and regulatory agencies. In other areas, construction would not take place within one-quarter mile of the trail, and close supervision would be used to ensure that construction equipment and personnel would not deviate from proposed construction corridors.

Important archaeological sites near SRS facilities would be protected by fencing or other appropriate means.

5.7 OTHER ENVIRONMENTAL FACTORS

Other factors to which mitigation measures would be applied include waste management, geology and soil, and outdoor lighting.

5.7.1 WASTE MANAGEMENT

All hazardous waste management activities and facilities would comply with applicable Federal and State regulations including pollution prevention planning. Hazardous waste would be separated by type and hazard level. All waste would be stored in suitable transport containers and collected at the SRS hazardous waste collection site. Both liquid and solid waste would be stored on concrete pads with sidewalls adequate to safely hold contents in accordance with EPA regulations. All liquid reaching the concrete would be cleaned up and handled according to the waste type and concentration. All hazardous waste would be shipped by a RCRA-permitted transport contractor to a RCRA-permitted facility for disposal, treatment, or recycling. Nonhazardous solid waste would be collected and stored in dumpsters to discourage scavenging animals.

1 The SRS would require sanitary facilities at each work area. At a minimum, a portable pump-out toilet
2 and hand-washing facilities would be required. The design of the sanitary facilities would accommodate
3 the projected growth, and each level of design would accommodate future increases in demand. During
4 construction and initial operations, septic tanks and leach fields would be adequate for treatment. A
5 central treatment plant would be constructed later. Wastewater disposal methods would depend upon
6 the level of treatment achieved in the treatment plant. If the wastewater were of sufficient quality and
7 were disinfected, it would be suitable for landscape watering and launch/landing complex coolant
8 (deluge water). Deep injection wells or evaporation ponds would provide adequate disposal. Installation
9 of a wastewater wetland and use of that water for nonpotable needs are other alternatives that will be
10 evaluated. Permanent wastewater evaporation ponds would not be located near the launch/landing
11 complex or the airfield and would not result in wildlife hazard. Water collecting in low areas from
12 storm-water runoff or launch deluge would be temporary and would not attract wildlife permanently.

13 During construction, the contractors would not be allowed to establish underground storage tanks for
14 petroleum or natural gas storage. Aboveground storage tanks are planned for the SCCF facility and
15 ground-vehicle maintenance area. These tanks would comply with all applicable Federal and State laws
16 and regulations. Any other tanks used for the storage of petroleum-based products or hazardous
17 materials also would be required to comply with the applicable laws and regulations.

18 **5.7.2 GEOLOGY AND SOILS**

19 All facilities and supporting infrastructure would be designed and constructed to the best available
20 technology standards for storm-water runoff control. The design of all facilities and infrastructure within
21 the 100-year floodplain would incorporate flood-control measures to prevent erosion and flash-flood
22 damage.

23 Activities in areas of high erosion potential would be designed to minimize surface disturbance to the
24 greatest extent possible. Areas of surface disturbance outside the actual facilities or roadway
25 construction areas would be reclaimed.

26 Appropriate temporary and permanent erosion and sedimentation control would be completed in
27 compliance with the National Pollution Discharge Elimination System permit program, and a Storm
28 Water Pollution Prevention Plan would be developed. Disturbed areas would be restored and stabilized

1 as soon as the construction schedule permits. Soils management would include coordination with the
2 related programs of other Federal agencies, as well as State and local government.

3 Design and construction of SRS facilities would be completed to assure conformity with building codes
4 designed for safe occupancy for structures within Seismic Zone 2B.

5 **5.7.3 OUTDOOR LIGHTING**

6 Outdoor lighting would be shaded or otherwise designed to maintain a dark sky environment for the
7 benefit of local astronomical observation and to minimize lighting annoyance. Low-pressure sodium
8 vapor fixtures or equivalent fixtures would be used that have permanently-installed shields to direct the
9 illumination downward. Working lights used for night maintenance would be shielded to minimize light
10 pollution.